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## Review on Hybrid Energy Generation

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### Abstract

Hybrid energy system is the combination of two energy sources for giving power to the load. In other word it can defined as "Energy system which is fabricated or designed to extract power by using two energy sources is called as the hybrid energy system." Hybrid energy system has good reliability, efficiency, less emission, and lower cost. In this proposed system solar and wind power is used for generating power. Solar and wind has good advantages than other than any other non-conventional energy sources. Both the energy sources have greater availability in all areas. It needs lower cost. There is no need to find special location to install this. solar panel give the output to the battery but sometimes there might be an increase in the intensity of the sunlight so there is a possibility of having damage to the battery. So here controller circuit will be used to provide constant voltage to the battery even when the intensity of the sunlight is high because when the intensity is high the solar panel will give double the voltage than it is required by the battery. A charge controller, charge regulator or battery regulator limits the rate at which electric current is added to or drawn from electric batteries. It prevents overcharging and may prevent against overvoltage, which can reduce battery performance or lifespan, and may pose a safety risk

**Index Terms:** Hybrid energy.

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### 1. Introduction

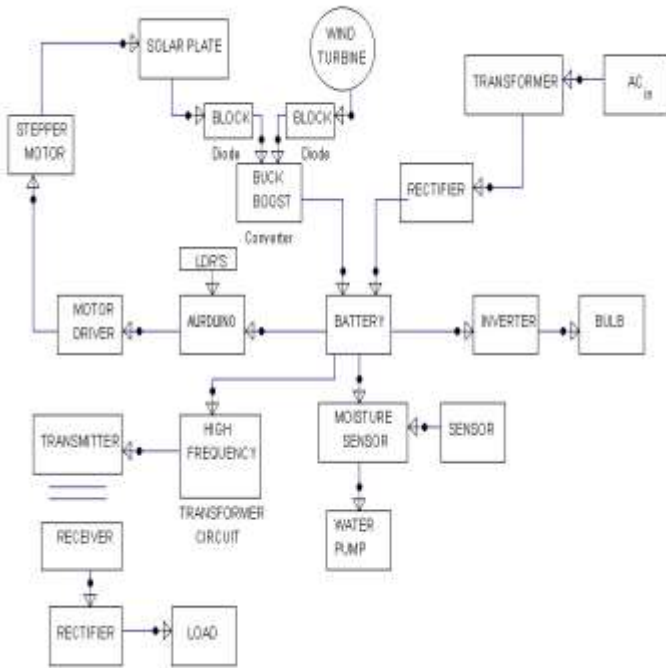
Solar panel is use to convert solar radiation to the electrical energy. The physical of PV cell is very similar to that of the classical diode with a PN junction formed by semiconductor material. When the junction absorbs light, the energy of absorbed photon is transferred to the electron-proton system of the material, creating charge carriers that are separated at the junction. The charge carriers in the junction region create a potential gradient, get accelerated under the electric field, and circulate as current through an external circuit. Solar array or panel is a group of a several modules electrically connected in series parallel combination to generate the required current and voltage. Solar panels are the medium to convert solar power into the electrical power.

Wind turbine is that system which extracts energy from wind by rotation of the blades of the wind turbine. Basically wind turbine has two types one is vertical and another is horizontal. As the wind speed increases power generation is also increases. The power generated from wind is not continuous its fluctuating. For obtain the non-fluctuating power we have to store in battery and then provide. it to the here. .

### 2.Design and Implementation

#### 2.1 Hybrid Power Generation System

A hybrid energy solution smoothes out the highs and lows of energy generation periods due to seasonality as solar irradiation and wind speeds change throughout the course of the year .The energy generating system consisting of wind and solar renewable resources. A hybrid renewable energy system means the combination of different type of system like solar wind. Solar Hydel etc.80% of the hybrid system is the combination of solar wind. In the proposed system plant capacity is 50KW. 30KW of power generate from wind systems (wind turbines) and 20 KW of power from solar systems (solar panels).In day time most of powers generate the solar systems. Wind systems generate more power from evening to night (5p.m to night).We get the average power for 24hrs. So we choose the hybrid systems. The total energy stored in the batteries through charge controller unit. The output of the batteries is connected through the inverters.



**Fig 1: Block Diagram For Hybrid Power Generation System**

**2.2 Solar Panel and Light Dependent Resistor**

Solar panel / PV panel are used to convert the renewable power coming from the sun into electrical energy. The principle of working solar panel is with semiconductors. Since, the whole eco-system on planet earth is dependent on sun energy and it's a huge source of never ending energy. Solar panels are photovoltaic which, generates electrical energy using sun light radiations. Depending on the position

n and intensity of the sun radiation the amount of electrical DC energy will produced. For the proposed project specifications and design, a 12V, 150 watt off grid solar panel is required. The standard size of the panel, available in the market, 48inch x 22inch x 2inches is most suitable however, other sizes can be considered.

Light Dependent Resistor is made of a high-resistance semiconductor. It can also be referred to as a photoconductor. If light falling on the device is of the high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron conducts electricity, thereby lowering resistance. Hence, Light Dependent Resistors is very useful in light sensor circuits. LDR is very high-resistance, when they are illuminated with light resistance drops dramatically.

A Light Dependent Resistor is a resistor that changes in value according to the light falling on it. A commonly used device, has a high resistance in the dark, and a low resistance in the light. Connecting the LDR to the microcontroller is very straight forward, but some software 'calibrating' is required. It

should be remembered that the LDR response is not linear, and so the readings will not change in exactly the same way as with a potentiometer. In general there is a larger resistance change at brighter light levels. This can be compensated for in the software by using a smaller range at darker light levels.

**2.3.Wind Turbine:** The wind is available 24 hours in earth's eco system. Wind turbine having large blades which are joined to rotor of generator leading to produce electrical energy as moves by flow of wind. Wind power is also renewable, never energy source and easily available within atmosphere. Wind turbine power plants are much more popular providing much more efficiency considering the space of implementation. Wind Turbine is mechanical system/machine which generates electrical energy from renewable wind energy source.

**2.4 Battery:** The electrical energy produced by the system is need to be either utilized completely or stored. Complete utilization of all the energy produced by the system for all the time is not possible. So, it should be store rather than useless wasting it. Electrical batteries is the most relevant, low cost, maximum efficient storage of electrical energy in the form of chemical reaction. Hence, batteries are preferred.

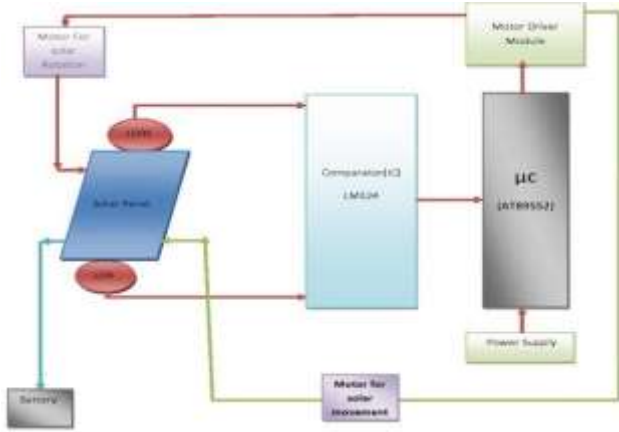
The energy generated from the proposed project is need to be store. One is attached to wind turbine for which a 120AmpH battery will be required, which will be fair enough full fill the storage capacity for targeted value. The second battery is 80AmpH is preferred for storing solar energy. But, as per application/ storage and demand battery capacity can be variable.

**2.5 Buck Booster :**

A DC-to-DC converter is a device that accepts a DC input voltage and produces a DC output voltage. Typically the output produced is at a different voltage level than the input. In addition, DC-to-DC converters are used to provide noise isolation, power bus regulation, etc.

**3. Solar Tracking System**

Solar tracker is an automated solar panel that actually follows the Sun to increase the power . The sun's position in the sky varies both with equipment over any fixed position many of residential around the world used electric solar system as a sub power at their houses. This is because solar energy is an unlimited energy resource, set to become increasingly important in the longer term, for providing electricity and heat energy to the user. The large scale solar tracker that normally used is not suitable for the residential use. As a result, this project will develop a Sun tracking system specially designed for residential use for a low cost solar cell. Previous researchers had used LDR and photodiode as sensors respectively. Meanwhile and used DC motor with gear and steeper motor respectively. LM7805 is used to convert the input voltage from the source to 5 V output because integrated circuit only need 5 V to operate.



**Fig 2: Diagram Solar Tracking System**

The sun rays will fall on the solar panel in two ways, which is, they will fall directly on the solar panel and also the reflector will reflect the incident rays on the solar panel. Suppose at the time of sun rise the sun is in extreme east the reflector will align itself in some position by which the incident rays will fall on the solar panel. Now when the earth rotates and the sun gets shifted from its earlier position the reflection of the incident rays will also change. Thus as a result the light will fall on the sensors kept on each side of the solar panel. The tracking circuit is so designed that when reflection falls on say the sensor attached to the right of the panel, the tracker will move towards the left, and visa-versa. Similar is the case when the reflection falls on the sensor attached at the top of the panel, circuit will make the tracker to move downwards.

We here have tried to bring two simple principles together. One being, the normal principle of incidence and reflection on which our tracker works. And the other is the principle on which the solar panel works, which is on the incidence of the solar rays the photovoltaic cells, will produce electricity. This both principles are combined there and as a result of which we are able to fetch nearly double the output which the panel gives normally. The tracker is liable for two kinds of rotations, one is on the vertical axis and other is on the horizontal axis. The earlier is for the right-left movement of the reflection and the later is for the up-down movement of the reflector, for aligning reflection on the panel.

**3.1 Solar Tracking System Circuit operation:**

In this paper use solar panel to convert the light energy into the electrical energy. The Sun change its position throughout the day that's why we can't able to utilize the whole light energy so we have made a tracking system in which solar panel can be rotate as per the sun changes its position.

the four LDR Sensor to sense the light and if the sun change its position then respective LDR Sensor sense the light and generate the highest Voltage signal and this highest voltage signal fed to the comparator IC as well as remaining sensors also give its generated voltage level to the Comparator IC. All Voltage signal of the each LDR sensor that are compared by the LM324 are fed to the microcontroller.

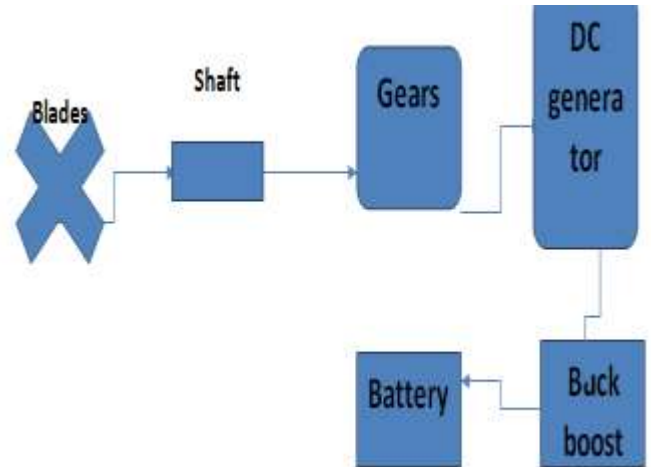
Microcontroller receives the voltage signal from the any I/O pin of the controller. Compares the each LDR output signal to with each LDR sensor output.

When the controller find the Highest voltage level of any LDR sensor gives the instruction to the motor through the motor driver circuit to rotate the solar panel on the single axis in the direction of the LDR sensor which are generating highest voltage output. so the Battery can recharge appropriately through the Solar panel and we can run the any electronic devices here we can rotate the 12 v dc fan regularly.

By using external two motor and by making connection in parallel we can move the solar panel in any direction. As by rotating the solar panel in the direction of the sun we utilize the maximum energy of the sun

**4. WIND ENERGY GENERATION SYSTEM :**

The wind is a free, clean, and inexhaustible energy source. It has served mankind well for many centuries by propelling ships and driving wind turbines to grind grain and pump water. Interest in wind power lagged, however, when cheap and plentiful petroleum products became available after World War II. The high capital costs and the uncertainty of the wind placed wind power at an economic disadvantage. Then in 1973, the Arab nations placed an embargo on petroleum. The days of cheap and plentiful petroleum were drawing to an end. People began to realize that the world's oil supplies would not last forever and that remaining supplies should be conserved for the petrochemical industry. The use of oil as a boiler fuel, for example, would have to be eliminated. Other energy sources besides oil and natural gas must be developing.



**Fig.3: Block diagram of Wind Energy Generation system**

Wind turbines are manufactured in a wide range of vertical and horizontal axis types. The smallest turbines are used for applications such as battery charging for auxiliary power for boats or caravans or to power traffic warning signs. Slightly larger turbines can be used for making contributions to a domestic power supply while selling unused power back to the utility supplier via the electrical grid. Arrays of large turbines, known as wind farms, are becoming an increasingly important source of intermittent renewable energy and are

used by many countries as part of a strategy to reduce their reliance on fossil fuels

#### 4. Application

Some of the applications for the system are listed follow,  
The system is used for domestic purpose.

Street lighting, Traffic signals

Various monitoring systems

Powering up for communication system

Pump irrigation Systems

Small Boats like yacht

As per requirement of electrical energy the system can be either designed or updated for higher energy requirement.

#### 5. Conclusion

In the present work a Solar PV Wind Hybrid Energy System was implemented. A portion of the energy requirement for a private house, farm house, a small company, an educational institution or an apartment house and irrigation system depending on the need at the site where used has been supplied with the electricity generated from the wind and solar power. It reduces the dependence on one single source and has increased with minimum cost. the reliability. Hence we could improve the efficiency of the system as compared with their individual mode of generation.

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